Advanced Pumps and Cold Plates for Two-Phase Cooling Loops, Phase I

Completed Technology Project (2005 - 2005)

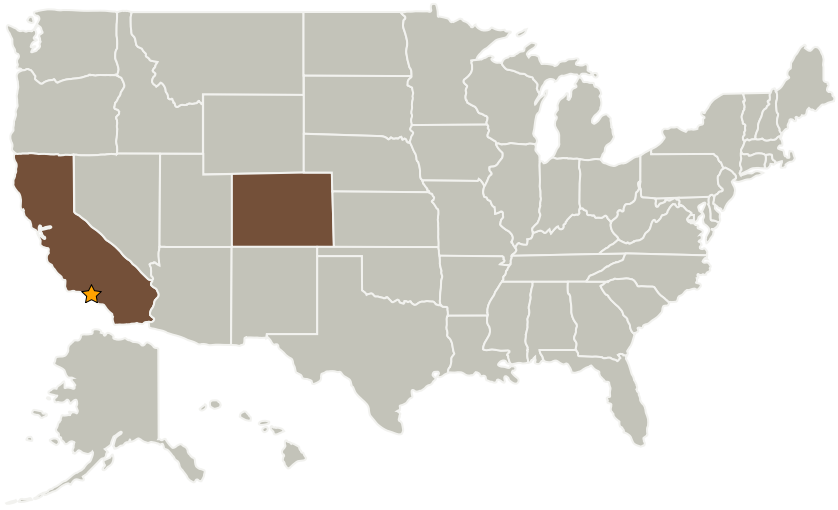
Project Introduction

Advanced instruments used for earth science missions require improved cooling systems to remove heat from high power electronic components and maintain tight temperature control for sensitive instruments. Mesoscopic Devices proposes to develop a pumped two-phase cooling loop that will provide high heat flux cooling (> 100 W/cm^2) in a lightweight system. In Phase I, an extremely compact pump optimized for two phase cooling will be demonstrated, along with advanced lightweight cold plates. A complete two-phase loop using the advanced pump and cold plates will be constructed and tested.

Anticipated Benefits

Two-phase pumped cooling loops are expected to be enabling technology for high-power motor drives, rack-mount computers, advanced workstations, and microwave systems for vacuum deposition. The proposed system could be adapted for cooling phased-array radars, communications and industrial lasers. The proposed two-phase pumped loop will enable cooling of multiple distributed loads, decreasing the mass and increasing the sensitivity of advanced instruments for terrestrial, aircraft, balloon and satellite missions. It can be used for cooling instruments, high power electronics, radar and laser systems.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Jet Propulsion Laboratory (JPL)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Jet Propulsion Laboratory(JPL)	Lead Organization	NASA Center	Pasadena, California
Mesoscopic Devices LLC	Supporting Organization	Industry	Broomfield, Colorado

Primary U.S. Work Locations	
California	Colorado

Project Management

Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Project Manager:
Celestino Jun Rosca

Principal Investigator:
Jerry D Martin

Technology Areas

Primary:

- TX14 Thermal Management Systems
  - TX14.2 Thermal Control Components and Systems
    - TX14.2.1 Heat Acquisition